



# National Transportation Safety Board

## Railroad Accident Brief

### Undesired Train Acceleration and Deceleration

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## The Accident

On March 19, 2016, about 1:54 a.m. mountain daylight time, train 425 of the Denver, Colorado, International Airport's (DEN) Automated Guided Transport System (AGTS) was routed from East Concourse C to the West Main Terminal through a turnout when it accelerated and then decelerated. No operator was on board the automated train. Four passengers were injured.

## Accident Narrative

On March 19, 2016, about 1:54 a.m., the DEN AGTS train was routed from East Concourse C to the West Main Terminal through a crossover when it accelerated to 22 mph and then decelerated to 8 mph.

The East Main Terminal was out of service at the time of the accident. On that day, train 425 had previously completed four routes without any problems. Just before the accident, as train 425 entered the crossover, it received a speed code to accelerate to 22 mph. The normal operating speed for this movement was 8 mph. Train 425 traveled 144 feet until it occupied the next track circuit. Train 425 then received a speed code that decelerated the train to 8 mph. The DEN AGTS equipment was manufactured by the Bombardier company, and a Bombardier technician was on board train 425. After the accident, the technician reported that the train traveled through the crossover at high speed.

Some of the passengers were injured when the train rapidly accelerated and then decelerated. Three passengers were transported to a local hospital by ambulance, and a fourth passenger was transported to a local hospital by private vehicle. Twenty-seven passengers were evaluated and released on scene. The remaining passengers refused medical attention.

The DEN AGTS operated underground within the secure areas of the airport using two 1.25-mile tunnels that run in a north/south direction. The tunnels were designated as the east tunnel and the west tunnel. The AGTS serviced four stations and ran through the middle of Concourses A, B, and C and the Main Terminal. Crossover tracks for trains traveling in either direction were located between the stations. Train travel was centered along each guideway with a guide beam affixed along the center of each guideway. An automatic train control system incorporates command, control, and communication equipment so that the AGTS did not need an operator.

At the time of the accident, Bombardier had a contract with the DEN to upgrade the AGTS signaling system. Bombardier was upgrading the central control hardware and software and the automatic train control system. The contract was scheduled for completion in September 2016.

At the time of the accident, the signal and train control system was undergoing a 60-day demonstration test. The test began on March 15, 2016, after the Safety Certification Report was issued, allowing passengers to use the AGTS.

## **Postaccident Action**

Immediately following the accident, an AGTS operations notice was issued that prohibited the use of the crossover. The accident scenario using the crossover was recreated using a train control simulator.

Postaccident testing by Bombardier identified a coding error in the software upgrade that allowed a 22-mph speed code to be transmitted with the crossover switches lined for a crossover move. Bombardier tested the same route on the guideway in the other direction, and the software did not have the coding error for the crossover move. Bombardier changed the software, fixing the software error.

## **Probable Cause**

The National Transportation Safety Board determines that the probable cause of the accident was a coding error in the software that allowed an incorrect speed code to be sent to the train while it traversed the crossover, resulting in rapid acceleration.

For more details about this accident, visit [www.nts.gov/investigations/dms.html](http://www.nts.gov/investigations/dms.html) and search for NTSB accident ID **DCA16FR006**.

**Adopted: September 30, 2016**

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The NTSB has authority to investigate and establish the facts, circumstances, and cause or probable cause of a railroad accident in which there is a fatality or substantial property damage, or that involves a passenger train. (49 U.S. Code § 1131 - *General authority*)

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties . . . and are not conducted for the purpose of determining the rights or liabilities of any person.” 49 *Code of Federal Regulations*, Section 831.4. Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report. 49 *United States Code*, Section 1154(b).

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